stables, and the varied information given on the prevention of disease. The reviser has scant sympathy with the use of the actual cautery; but here he is on debatable ground, and, notwithstanding his strictures, we fancy veterinarians will not lightly lay aside an agent which, rightly or wrongly, most of them believe to be potent for good.

The illustrations form the least satisfactory portion of the work. Many of them are grotesque and ludicrous to the last degree, and ought to have been eliminated from the present revised edition. Some, such as those indicative of the symptoms of colic, are good, and well convey their intended meaning. W. F. G.

Handleiding tot de Kennis der Flora van Nederlandsch Indië. Door Dr. J. G. Boerlage. Tweede Deel, "Dicotyledones Gamopetalæ." Eerste Stuk, "Inferæ—Heteromeræ; Caprifoliaceæ—Styracaceæ." (Leyden: E. J. Brill, 1891.)

PREVIOUS parts of this work have been noticed in these columns. It is more than thirty years since the last part of Miquel's "Flora Indiæ Batavæ" appeared, a work written chiefly in Latin; but the present publication cannot be regarded as replacing it, or as being a successor to it. So far as we have tested this "Manual," it is a Dutch translation of the descriptions of the natural orders and genera in Bentham and Hooker's "Genera Plantarum," followed by a list of the species inhabiting the Dutch Indies. Locally it may be serviceable; but what is wanted by botanists generally is a new descriptive elaboration of the species of the region in question.

W. B. H.

By Sea-shore, Wood, and Moorland: Peeps at Nature. By Edward Step. (London: S. W. Partridge and Co., 1891.)

THE author of this book, under his pseudonym "James Weston," published in 1886 "Stories and Pictures of Birds, Beasts, and Fishes"; and, two years later, a companion volume, "Stories and Pictures of Animal Life." Both of these volumes, which were very popular, are now out of print. In the present work they have been amalgamated, and the author has added to them some brief "nature-papers" which he has contributed to various periodicals. The book is intended chiefly for young people, and it is so pleasantly written that children who have a chance of reading it can hardly fail to find it attractive. They will obtain from it much interesting information about all sorts of animals, and it will help them to realize that even the most familiar objects, when properly observed, may be worthy of close study. The book is very carefully illustrated.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Note on the Chromosphere Spectrum.

WITH the new spectroscope of the Halsted Observatory, which has a 5-inch Rowland grating of 20,000 lines to the inch, I have repeatedly observed of late that the bright chromosphere line, Angström 6676·9 (No. 2 in my catalogue of chromosphere lines), is not coincident with the corresponding dark line of the solar spectrum, but is *less refrangible* by about one-third of a unit of Rowland's scale. This chromosphere line, therefore, can no longer be ascribed to iron, but must be due to some other substance as yet undetermined.

I think there can be no doubt as to the non-coincidence. The interval between the bright and dark lines varies to some extent with circumstances, being usually less in the chromosphere spectrum on the sun's eastern limb than on the western, and it is often affected by motions in the line of sight; but nine times out of ten the want of coincidence is perfectly obvious.

I may add that I have also obtained a considerable number of photographs of the ultra-violet spectrum of the chromosphere with the new instrument, and get complete confirmation of almost all Mr. Hale's results. I find not only the constant reversal of the H and K lines, but I have obtained, so far, five of the ultra-violet series of hydrogen lines; the first of them being the well-known "companion" of H (first visually observed by myself in 1880), and the other four in their regular succession above it.

The only point in which my plates fail to confirm Mr. Hale's is that I have not yet succeeded in catching the duplicity of the hydrogen α (3889). Several of his plates show at this point two lines near together; none of mine do so, and I conclude that the companion line makes its appearance only rarely. I first observed this line visually in 1883 (*American Journal of Science*, November 1883), and it has since been often seen here by my assistant, Mr. Reed, as well as by myself.

Of course the opinion is no longer tenable that H and K can be due to hydrogen, since the measures clearly show that the companion to H belongs to the hydrogen series. But I am still sceptical whether they are due to calcium, at least in its terrestrial condition. C. A. YOUNG.

Princeton, N.J., U.S., October 20.

Formation of a Temporary Cyst in the Fresh-water Annelid *Æolosoma.*

AS I am not aware that the formation of a temporary chitinous cyst has been described in any Oligochætous Annelid, the following observations may be of some little interest. A few days ago Mr. Latter, science master at the Charterhouse, kindly forwarded to me three tubes containing a quantity of *Æolosoma quaternarium.* They were so abundant that every drop of water contained several specimens; in the water I found also a still larger number of spherical bodies, which proved to be cysts, each completely filled by a single worm coiled once upon itself. The cysts were perfectly colourless and transparent, and very thin-walled; one cyst was found empty, and had been ruptured by the worm in escaping from it. Twenty-six years ago Maggi (*Mem. Soc. Ital. Sci. Nat.*, 1865) described and figured some bodies, oval in form, which he believed to be the cocoons of *Æolosoma;* embryos were found in these cocoons in different stages of development. Prof. Vejdovsky (*Entwickelungsgesch. Unters.*, Heft 1, Prag, 1888) suggested the possibility that these bodies were really cysts; my own examination of what are, I think, undoubtedly cysts in *Æolosoma* leads me to agree with Vejdovsky's suggested interpretation of Maggi's figures. If the structures which I describe here are really cocoons, their form differs from that of the cocoons of all other Oligochæta, in being spherical and without a narrow process at either pole; moreover, it is—on the hypothesis that they are cocoons—a remarkable coincidence that they should *all* contain completely adult worms; finally, and this is of course conclusive, the intestinal tract of the worms contained vegetable detritus. The cysts, as I believe them to be, are of about the size of a *Volvox globator.* In this encysted condition the worms might perhaps be easily transported from place to place; I have found that they survived the evaporation of the surrounding water upon a glass slide for a considerable period; the worms were in continual movement within their cysts, so that it was quite easy to be sure that they were alive. Now this very species has a wide distribution, which may perhaps be partially accounted for by this habit of encystment; with regard to other fresh-water Annelids which have a wide range, such as *Tubifex*, it is possible that birds may inadvertently transport the cocoons from country to country. It is not known yet whether *Æolosoma* forms a cocoon, though it is probable, as the worm develops a clitellum. But sexual maturity appears to be a comparatively rare occurrence in *Æolosoma;* very few observers appear to have seen the sexually mature worms. If this is so, the encystment of the worm may take the place of one of the secondary uses of the cocoon—namely, to aid in the diffusion of the species. FRANK E. BEDDARD.

Polytechnics and Recreation.

IN Mr. Oliver Dawson's article on Polytechnics in your issue of the 8th inst. (vol. xliv., p. 547) he says: "although

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those institutes which make much of athleticism and such matters attract the largest proportion of students, the attendance *pro ratâ* in the class-rooms would not favourably compare with an institute carrying out a purely educational programme." A Polytechnic is mentioned in which, though only seven students entered the class, "scores of young men could be found in the billiard-room and gymnasium"; and the opinion is expressed that even the excellent work of the Regent Street Polytechnic "would be still better if it could be relieved of the recreative element."

May I say a word for recreation, as the representative of a College which will eventually form part of the South London Polytechnic, and which has not been "started by a teacher," but has grown up out of a purely recreative institution, for the Victoria Hall (the parent of the Morley Memorial College) is nothing more, unless we use the word in a very narrow sense.

It is a commonplace truth that the aim of education should be to develop the whole man, not to make mere intellectual experts any more than mere manual experts. Surely recreation has not only a legitimate but a very important place in this, especially where sedentary workers are concerned. Those whose tastes are naturally studious may with comparative safety be left to take care of themselves. In these days, instruction of some sort may be had by most of those who set their minds on it, and if they miss much which books or the living teacher would have enabled them to gain, at least their energy is not likely to be turned into hurtful channels. Those who desire recreation can also get it, and with little exertion; but of what kind? If the gymnasium spoken of above had not been open, what would its scores of frequenters have been doing? Some, no doubt, might have been in class, improving their minds more than they are likely to do in a gymnasium; but others, whose youthful spirits need an outlet, would not have been much attracted by study not associated with recreation. The music-hall, or some of the many forms of betting now prevalent, would have been more likely to entice them. In the confined life of our towns it is no small good to provide athletic sports (apart from temptation to drink) as a safety-valve for boyish spirits, even if the good stops short there. But it need not stop short. Of course, there is danger lest the recreative side of an institute or Polytechnic should swamp the educational, unless care is taken to prevent it. A very simple rule, however, is sufficient for this. Our members are not allowed to use the gymnasium or recreation rooms unless they are *bonâ fide* students of at least one class. It is not sufficient that they should *take a ticket* for a class. The registers are occasionally looked over, and if frequent absence from class is combined with frequent attendance in the gymnasium or recreation rooms, a warning, suspension, or even expulsion, is the consequence. We have found that only in an insignificant number of cases is it necessary to proceed to the last resort. Our students as a rule receive an excellent character for steady work from such of our teachers as are in a position to compare them with other students. "I am tired of teaching lads who are trying not to learn," said one who held an important position in a large educational establishment; "your fellows mean business; it's a pleasure to teach *them*." And the testimony of others is to the same effect.

If the moving spirits of a Polytechnic love work themselves, and if they are careful to enlist the sympathy of students, so as to lead them by example rather than drive them by rigid rule, then there is little danger of the institution degenerating into a mere place of amusement. EMMA CONS.

Samuel Morley Memorial College, Waterloo Road, S.E., October 16.

"$W = Mg$."

I SHOULD like to take exception to Prof. Greenhill's statement in your issue of September 24 (vol. xliv. p. 493) that "when goods are sold in commerce by weight, they are weighed in scales, and the weight is the same wherever the weighing is carried out, whether at the equator, or the poles, or in the Moon, Sun, or Jupiter." In this country it is the commonest thing in the world to see goods sold in commerce weighed in a spring-balance, which is also the universal kitchen weighing apparatus, and I respectfully submit that the weight indicated would *not* be quite the same in the Moon, Sun, or Jupiter.

The appeal to the scales seems to me to be an attempt to throw dust in our eyes, as what Prof. Greenhill really means is that two *equal* weights are *equal* (not each the *same*) wherever the weighing is carried on—a balance telling us nothing about the weight, or pull downwards, of either one.

I was fortunate in getting some of my first notions of dynamical measurements from Thomson and Tait, and hence the appearance of the "blooming g" did not seem unnatural, for after I had learned how to measure a force properly in dynamical units, I was told that a pound's weight $= g$ poundals, or a gram's weight $= g$ dynes, which suffices for reduction to non-absolute units. This, in my opinion, is virtually the same as Prof. Slate's suggestion. I never could see why g should appear in dynamical formulas: measure in absolute units, and at the end reduce to pounds' weight from poundals as above. Of course this involves knowing what an absolute dynamical unit is, and it strikes me that a few more "horizontal" experiments with spring-balances, graduated in poundals or dynes, and a little less thinking about arm balances, would go far to clear up difficulties in the minds of students. ARTHUR G. WEBSTER.

Clark University, Worcester, Mass., October 14.

[It will be interesting to see if Mr. Webster can devise a horizontal spring dynamometer which will record within 10 per cent. of the true value; also to know what corrections he would apply for the inertia, temperature, and fatigue of the spring, and how he would occasionally test the indications. These difficulties have to be met in Diagrams given by Steam-Engine Indicators. How does the Inspector of Weights and Measures test Spring-Balances in America?—A. G. G.]

Alum Solution.

PERHAPS the following evidence of the *practical* superiority of potash alum solution to distilled water in adiathermancy, *when the electric arc is the radiant* and the "radiometer" a Crookes, may be of interest. The same glass-sided cell was used throughout, and the difference of voltage between the carbons ("Apostle") was kept sensibly constant (40 volts) through the experiments. Between each observation on the liquids the radiation from the arc was observed unimpeded, save by the glass of the radiometer, as recorded below. The time was given by a metronome (previously examined for constancy) beating half-seconds. No lens was used.

	No. of revolutions of radiometer arms.	Time in half-seconds.
1. Unimpeded radiation ...	25	160
2. Through empty cell ...	25	254
3. Unimpeded radiation ...	25	152
4. Cell + water	25	820
5. Unimpeded radiation ...	25	164
6. Cell + water (second experiment)	25	832
7. Unimpeded radiation ...	25	160
8. Cell + alum solution ...	25 (time of two revolutions actually taken.)	43,200
9. Unimpeded radiation ...	25	160

The current throughout was 6·4 amperes, thickness of each glass plate 1·5 mm., thickness of solution 50 mm., distance of radiometer from arc 1 metre. T. C. PORTER.

Eton College, October 29.

The Salt Lake of Aalia Paakai.

I HAVE recently made an analysis of the water of the salt lake of Aalia Paakai, near Honolulu, and have thought that the results might be of interest to the readers of NATURE. The lake occupies the crater of an immense tufa cone, whose ejecta cover several square miles, and are especially remarkable for containing numerous aggregations of crystalline grains of pure olivine. The lake is just at mean sea-level, and is scarcely a mile distant from the ocean, but there is evidently no free communication with the waters of the sea.

During the dry months crusts of salt are deposited, sometimes six inches or more in thickness, on the bottom of the lake, and the salt has at times been taken out for use. In the rainy season the salt is wholly redissolved. The crust of salt is at the present

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